PB - Lead Exposure/Lead Toxicity

PB-C COMPLICATIONS

OUTCOME: The patient/family will understand the common and important complications of lead exposure and lead toxicity.

STANDARDS:

1. Discuss the effects of lead on neurobehavioral systems as per current medical understanding. (As of 5-2003 it is thought that even low levels of lead exposure, e.g., less than 10Φg/dl can result in subtle neurobehavioral changes such as hyperactivity, lower IQ levels and poor school performance.)
2. Explain that older children and adults with high bone lead levels may exhibit aggressive behavior and antisocial behaviors.
3. As appropriate, discuss the effects of long term high levels of lead exposure. These may include vomiting, abdominal pain, constipation, ataxia, seizures, papilledema, impaired consciousness and eventually coma. The latter of these symptoms are associated with acute lead encephalopathy.

PB-DP DISEASE PROCESS

OUTCOME: The patient/family will understand how humans are exposed to lead and the effects of lead on humans.

STANDARDS:

1. Discuss that lead is most often introduced to humans via hand-to-mouth activity of young children, either as ingested dirt, dust licked off surfaces (including toys) and ingested paint chips. Less commonly lead may be ingested from water flow through lead pipes or brass fixtures, or from food served or prepared in ceramic bowls which have a lead glaze.
2. Discuss that the nutritional status of the individual impacts the amount of lead that is absorbed, e.g., lead ingested on an empty stomach is more likely to be absorbed than if the stomach is full. Calcium and iron may decrease lead absorption by direct competition for binding sites. Iron and/or calcium deficiency are likely to cause an individual to have enhanced lead absorption.
3. Explain that lead interrupts several chemical systems in the body and can lead to toxic levels of other chemicals in addition to the lead. Lead directly interferes with neurotransmitter release in the brain and may directly affect the developmental structure of the brain in utero and in the first few years of life. This latter effect may be an irreversible effect.

PB-FU FOLLOW-UP

OUTCOME: The patient/family will understand the importance of follow-up in the treatment of lead exposure and lead toxicity.

STANDARDS:

1. Discuss the importance of follow-up care, including the importance of assessing the effectiveness of treatment and correcting problems that may develop.
2. Discuss the procedure for obtaining follow-up appointments and that follow-up appointments should be kept.
3. Emphasize that full participation of the treatment plan is the responsibility of the patient/family.
4. Discuss signs/symptoms that should prompt immediate follow-up.
5. Discuss the availability of community resources and support services and refer as appropriate.

PB-L LITERATURE

OUTCOME: The patient/family will receive literature about lead exposure and lead toxicity.

STANDARDS:

1. Provide the patient/family with literature on decreasing lead exposure, lead toxicity, and or lead abatement programs.
2. Discuss the content of the literature.

PB-MNT MEDICAL NUTRITION THERAPY

OUTCOME: The patient/family will understand the specific nutritional intervention(s) needed for treatment or management of lead toxicity.

STANDARDS:

1. Explain that Medical Nutrition Therapy (MNT) is a systematic nutrition care process provided by a Registered Dietitian (RD) that consists of the following:
    a. Assessment of the nutrition related condition.
    b. Identification of the patient's nutritional problem.
    c. Identification of a specific nutrition intervention therapy plan.
    d. Evaluation of the patient's nutritional care outcomes.
    e. Reassessment as needed.
2. Review the basic nutrition recommendations for the treatment plan.
3. Discuss the benefits of nutrition and exercise to health and well-being.

4. Assist the patient/family in developing an appropriate nutrition care plan.
5. Refer to other providers or community resources as needed.

PB-N NUTRITION

OUTCOME: The patient/family will understand the importance of proper nutrition in lead toxicity.

STANDARDS:

1. Discuss that the nutritional status of the individual impacts the amount of lead that is absorbed, e.g., lead ingested on an empty stomach is more likely to be absorbed than if the stomach is full. Discuss that calcium and iron may decrease lead absorption by direct competition for binding sites.
2. Discuss that iron and/or calcium deficiency are likely to cause an individual to have enhanced lead absorption.
3. Refer to the registered dietitian for MNT and/or physician if a calcium or iron deficiency is present or suspected.

PB-P PREVENTION

OUTCOME: The patient/family will understand mechanisms to prevent or limit exposure to lead.

STANDARDS:

1. Review nutritional mechanisms to decrease lead absorption. **Refer to PB-N**.
2. Discuss mechanisms to decrease lead exposure:
    a. Wash your hands before you eat.
    b. Take your shoes off at the door to avoid tracking in possibly contaminated dust.
    c. Consult the health department before remodeling homes built before 1978.
    d. Avoid eating dirt or paint chips.
    e. Avoid eating out of pottery which may have been glazed with a lead-based glaze.
    f. Avoid home remedies, especially from foreign lands such as Asia or Mexico. (Azarcon, greta, rueda all may contain lead.)
    g. Avoid eating candies, syrups, or vanilla manufactured in Mexico or South America.
    h. Avoid crayons not manufactured in the United States.
    i. Avoid mini-blinds that do not have a label indicating that they are lead-free.

3. Explain the importance of removing lead from clothing, shoes, and your body if you work in an industry where lead exposure is likely.

PB-SCR SCREENING

OUTCOME: The patient/family will understand the importance of routine screening for high-risk populations and who is at highest risk for lead exposure.

STANDARDS:

1. Discuss that the following persons are at highest risk for lead exposure:
    a. Live in or regularly visit a house or day care built before 1950 (especially if there is chipping or peeling paint.)
    b. Live in or regularly visit a house built before 1978 that has been recently remodeled (in the last 6 months.)
    c. Engage in frequent hand-to-mouth activity
    d. Have iron deficiency or anemia
    e. Live with an adult with a job or hobby that involves exposure to lead
        i. Pottery or stained glass
        ii. Bridge construction
        iii. Battery recycling
        iv. Paint and body work on cars or equipment
        v. Furniture manufacturing
        vi. Bullet or fishing weight casting
    f. Have siblings or playmates that have or have had lead poisoning
    g. Live in an area that is known to be contaminated with lead
2. Discuss the importance of routine screening for all persons in high-risk populations.
    a. Routine screening is typically performed at 6 months of age, one year of age and annually through 6 years of age (when hand-to-mouth activity generally decreases):
        i. In older children with mental retardation who may have prolonged hand-to-mouth activity
        ii. In pregnancy
        iii. When deemed appropriate by a healthcare provider
        iv. If requested by a patient or caregiver

PB-TE TESTS

OUTCOME: The patient/family will understand the type of lead testing to be done and the implication this has for future testing or treatment.

STANDARDS:

1. Explain that lead testing can be done utilizing a variety of specimens.
2. Explain the test to be performed as well as alternative testing mechanisms as appropriate:
    a. Capillary blood testing - usually a screening method and will need to be confirmed with venous blood analysis if the level is greater than 10Φg/dl.
    b. Venous blood testing - used as a confirmatory test upon which future testing or treatment will be based.
    c. Urinary lead levels - usually used during chelation therapy to determine the response to therapy.
    d. Hair lead levels - unreliable secondary to likelihood of contamination or lack of standardized interpretation tools.
    e. Discuss as appropriate the CDCs recommendation for follow-up testing and/or treatment based on venous blood lead levels.
    f. 10-19Fg/dl repeat venous level in 3 months, try to identify sources of lead exposure.
    g. 20-44Fg/dl repeat venous level in one week to one month, try to identify sources of lead exposure and remove child from the environment or source from child's environment.
    h. 45-59Fg/dl repeat venous lead level in 48 hours, try to identify sources of lead exposure and remove child from the environment or source from child's environment. Consult toxicologist for possible chelation therapy.
    i. 60-69Fg/dl repeat venous lead level in 24 hours, try to identify sources of lead exposure and remove child from the environment or source from child's environment. Consult toxicologist for possible chelation therapy.
    j. 70Fg/dl repeat venous lead level immediately, try to identify sources of lead exposure and remove child from the environment or source from child's environment. Consult toxicologist for possible chelation therapy.

PB-TX TREATMENT

OUTCOME: The patient/family will understand the possible treatments that may be performed based on the test results.

STANDARDS:

1. Discuss the blood lead level that would require chelation therapy and how this relates to this patient and current blood lead level. **Refer to PB-TE**.
2. Discuss as appropriate that children with blood lead level 45Fg/dl are often candidates for chelation therapy.
3. Explain as appropriate, that chelation therapy for persons with lead encephalopathy can be life-saving and chelation therapy for persons without lead encephalopathy may prevent symptom progression and further toxicity.
4. Discuss the agent to be used for chelation in persons who are to undergo chelation. Discuss the risks and benefits of treatment.
5. Explain that the treatment decision will be made by the patient and medical team after reviewing the results of diagnostic tests.